

**U.S. FISH AND WILDLIFE SERVICE
SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM**

SCIENTIFIC NAME: *Cyanea obtusa*

COMMON NAME: Haha

LEAD REGION: Region 1

INFORMATION CURRENT AS OF: July 2005

STATUS/ACTION:

☐ Species assessment - determined species did not meet the definition of endangered or threatened under the Act and, therefore, was not elevated to Candidate status

☐ New candidate

☒ Continuing candidate

☐ Non-petitioned

☒ Petitioned - Date petition received: May 11, 2004

☐ 90-day positive - FR date:

☒ 12-month warranted but precluded - FR date: May 11, 2005

☐ Did the petition request a reclassification of a listed species?

FOR PETITIONED CANDIDATE SPECIES:

a. Is listing warranted (if yes, see summary of threats below)? yes

b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? yes

c. If the answer to a. and b. is "yes", provide an explanation of why the action is precluded. We find that the immediate issuance of a proposed rule and timely promulgation of a final rule for this species has been, for the preceding 12 months, and continues to be, precluded by higher priority listing actions. During the past 12 months, most of our national listing budget has been consumed by work on various listing actions to comply with court orders and court-approved settlement agreements, meeting statutory deadlines for petition findings or listing determinations, emergency listing evaluations and determinations and essential litigation-related, administrative, and program management tasks. We will continue to monitor the status of this species as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures. For information on listing actions taken over the past 12 months, see the discussion of "Progress on Revising the Lists," in the current CNOR which can be viewed on our Internet website (<http://endangered.fws.gov>).

☐ Listing priority change

Former LP: ☐

New LP: ☐

Date when the species first became a Candidate (as currently defined): 1997

☐ Candidate removal: Former LP: ☐

☐ A – Taxon is more abundant or widespread than previously believed or not subject to

the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.

- ☐ U – Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.
- ☐ F – Range is no longer a U.S. territory.
- ☐ I – Insufficient information exists on biological vulnerability and threats to support listing.
- ☐ M – Taxon mistakenly included in past notice of review.
- ☐ N – Taxon does not meet the Act’s definition of “species.”
- ☐ X – Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Flowering plants, Campanulaceae (Bellflower family)

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Hawaii, island of Maui

CURRENT STATES/ COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: Hawaii, island of Maui

LAND OWNERSHIP:

The known populations occur on lands owned by the State’s Department of Hawaiian Home Lands, Department of Land and Natural Resources (Forest Reserve), and other State and private lands on east and west Maui.

LEAD REGION CONTACT: Paul Phifer, 503-872-2823, paul_phifer@fws.gov

LEAD FIELD OFFICE CONTACT: Pacific Islands Fish and Wildlife Office, Christa Russell, 808-792-9400, christa_russell@fws.gov

BIOLOGICAL INFORMATION:

Species Description *Cyanea obtusa* are shrubs 2 to 5 meter (m) (6.6 to 16 feet (ft)) tall, with branched and pubescent stems. Leaves are oblong to oblanceolate, with blades 15 to 30 centimeters (cm) (6 to 12 inches (in)) long and 4 to 9 cm (1.6 to 3.5 in) wide, with the upper surface green and sparsely pubescent, and the lower surface pale green and densely pubescent. Inflorescences are 6 to 12-flowered, densely pubescent, and with peduncles 20 to 50 millimeters (mm) (0.8 to 2.0 in) long. The hypanthium is obovoid, with narrowly triangular calyx lobes 1 to 2 mm (0.04 to 0.08 in) long. The corolla is purplish, 30 to 36 mm (1.2 to 1.4 in) long, 1.5 to 3 mm (0.06 to 0.12 in) wide, and is also densely pubescent. Berries are unknown (Lammers 1999).

Taxonomy *Cyanea obtusa* was described by Hillebrand. This species is recognized as a distinct taxon in Lammers (1999) and Wagner and Herbst (2003), the most recently accepted Hawaiian plant taxonomy.

Habitat *Cyanea obtusa* is found on gulch slopes in *Metrosideros polymorpha* mixed mesic forest with *Acacia koa*, *Nestigis sandwicensis*, *Pleomele auwahiensis*, *Psychotria* sp., and at an elevation of 951 meters (3,119 feet). This species has also been observed along steep sections of watercourses in *Metrosideros-Acacia-Cheirodendron* montane mesic forest with *Diplazium sandwichianum*, *Phyllostegia ambigua*, and *Vaccinium calycinum*, at elevations between 902 to 1,487 meters (2,960 to 4,880 feet) (Hawaii Natural Heritage Program Database 2004).

Historical and Current Range/Current Status *Cyanea obtusa* was thought to be extinct following the initial collections from 1841 to 1919 on east and west Maui, until it was rediscovered in 1981 on east Maui. The one known population was extirpated by 1989. In 1996, the species was rediscovered on east Maui, in a population of only four individuals. In 1999, additional plants were found on east and west Maui, increasing the known populations to six and the known number of individuals to approximately 30 (Hobdy *et al.* 1991; Art Medeiros, U.S.G.S. Biological Resources Discipline, pers. comm. 1996; Wood and Perlman 1997; Lammers 1999; Joel Lau, Hawaii Natural Heritage Program, pers. comm. 1999; Hank Oppenheimer, Maui Land and Pineapple, pers. comm. 1999).

THREATS:

A. The present or threatened destruction, modification, or curtailment of its habitat or range. Between 1981, when it was rediscovered after almost 70 years, and 1989, when the only known population was no longer extant, *Cyanea obtusa* was thought to have been extirpated by feral ungulates (pigs, goats, and cattle), which remain a threat to the populations discovered in 1996 and 1999 (Hobdy *et al.* 1991; A. Medeiros, pers. comm. 1996). As early as 1778, European explorers introduced livestock, which became feral, increased in number and range, and caused significant changes to the natural environment of Hawaii. Past and present activities of introduced alien mammals are the primary factor altering and degrading vegetation and habitats on Maui. The pig (*Sus scrofa*) is originally native to Europe, northern Africa, Asia Minor, and Asia. European pigs, introduced to Hawaii by Captain James Cook in 1778, became feral and invaded forested areas, especially wet and mesic forests and dry areas at high elevations. They are currently present on Maui and four other islands, and inhabit rain forests and grasslands. While rooting in the ground in search of the invertebrates and plant material they eat, feral pigs disturb and destroy vegetative cover, trample plants and seedlings, and threaten forest regeneration by damaging seeds and seedlings. They disturb soil and cause erosion, especially on slopes. Alien plant seeds are dispersed on their hooves and coats as well as through their digestive tracts, and the disturbed soil is fertilized by their feces, helping these plants to establish. Pigs are a major vector in the spread of many introduced plant species (Smith 1985; Stone 1985; Medeiros *et al.* 1986; Scott *et al.* 1986; Tomich 1986; Cuddihy and Stone 1990; Wagner *et al.* 1999a).

The goat (*Capra hircus*), a species originally native to the Middle East and India, was successfully introduced to the Hawaiian Islands in 1792. Currently populations exist on Kauai, Oahu, Maui, and Hawaii. Goats browse on introduced grasses and native plants, especially in drier and more open ecosystems. Feral goats eat native vegetation, trample roots and seedlings, cause erosion, and promote the invasion of alien plants. They are able to forage in extremely

rugged terrain and have a high reproductive capacity (Clarke and Cuddihy 1980; van Riper and van Riper 1982; Scott *et al.* 1986; Tomich 1986; Culliney 1988; Cuddihy and Stone 1990).

Cattle (*Bos taurus*), the wild progenitor of which was native to Europe, northern Africa, and southwestern Asia, were introduced to the Hawaiian Islands in 1793. Large feral herds developed as a result of restrictions on killing cattle decreed by King Kamehameha I. While small cattle ranches were developed on Kauai, Oahu, and west Maui, very large ranches of tens of thousands of acres were created on east Maui and Hawaii. Much of the land used in these private enterprises was leased from the State or was privately owned and classified as Forest Reserve and/or Conservation District land. Cattle eat native vegetation, trample roots and seedlings, cause erosion, create disturbed areas into which alien plants invade, and spread seeds of alien plants in their feces and on their bodies. The forest in areas grazed by cattle becomes degraded to grassland pasture, and plant cover is reduced for many years following removal of cattle from an area. Several alien grasses and legumes purposely introduced for cattle forage have become noxious weeds (Tomich 1986; Cuddihy and Stone 1990).

Pig, goat, and cattle exclusion fences protect one of the six known populations of this species, and another fence is under construction to protect a second population. Continued monitoring and maintenance of these fences will be necessary as feral ungulates from surrounding areas can easily access fenced areas. In addition, the remaining, unfenced individuals of this taxon are still impacted by this threat.

B. Overutilization for commercial, recreational, scientific, or educational purposes.
None known.

C. Disease or predation.

Rats and slugs are a major threat to members of the bellflower family in Hawaii and therefore area a potential threat to this species. They will eat any portion of the plant, and have been documented completely removing all leaves from plants (J. Lau, pers. comm. 1994; Loyal Mehrhoff, U.S. Fish and Wildlife Service (Service), pers. comm. 1994). Currently, there are no control measures being implemented for these threats.

Of the four species of rodents that have been introduced to the Hawaiian Islands, the species with the greatest impact on the native flora and fauna is probably *Rattus rattus* (black or roof rat), which now occurs on all the main Hawaiian Islands. Black rats, and to a lesser extent *Mus musculus* (house mouse), *R. exulans* (Polynesian rat), and *R. norvegicus* (Norway rat), eat the fruits of some native plants, especially those with large, fleshy fruits. Many native Hawaiian plants produce fruit over an extended period of time, thus producing a prolonged food supply for rodent populations. Black rats strip bark from some native plants, and eat the fleshy stems and fruits of plants in the bellflower and African violet families (Tomich 1986; Cuddihy and Stone 1990; J. Lau, pers. comm. 1994). Rat damage to the stems of species of *Cyanea* has been reported in the wet forests of Kauai. On the island of Hawaii, a species in a closely related genus was completely defoliated by rats (Jack Jeffrey, Service, pers. comm. 1995). It is very likely that rats eat the fruits of *Cyanea obtusa* because they have large, fleshy fruit.

Little is known about the predation of certain rare Hawaiian plants by slugs. Indiscriminate predation by slugs on plant parts of the related *Cyanea remyi* has been observed by field botanists (L. Mehrhoff, pers. comm. 1994; S. Perlman, pers. comm. 1994). The effect of slugs on the decline of this and related species is unclear, although slugs may pose a threat by feeding on the stems and fruit, thereby, reducing the vigor of the plants and limiting regeneration. Outplanted seedlings of the closely related genus *Clermontia* have been completely removed by slugs (Alvin Yoshinaga, University of Hawaii's Lyon Arboretum, pers. comm. 1995).

D. The inadequacy of existing regulatory mechanisms.

Feral pigs and goats are managed as game mammals in Hawaii but many herds populate inaccessible areas where hunting is difficult, if not impossible, and therefore has little effect on their numbers (Hawaii Heritage Program 1990). Hunting of pigs and goats is allowed on all islands either year-round or during certain months, depending on the area (Hawaii Department of Land and Natural Resources n.d.-a, n.d.-b, n.d.-c). However, public hunting does not adequately control the number of ungulates to eliminate this threat to native plant species. Hunting of feral cattle is no longer allowed in Hawaii (Hawaii Department of Land and Natural Resources 1985) except under permitted conditions. Pig, goat, and cattle exclusion fences protect one of the six known populations of this species, and another fence is under construction to protect a second population. Continued monitoring and maintenance of these fences will be necessary as feral ungulates from surrounding areas can easily access fenced areas. In addition, the remaining, unfenced individuals of this taxon are still impacted by feral ungulates.

E. Other natural or manmade factors affecting its continued existence.

Alien plant species threaten this species (A. Medeiros, pers. comm. 1996; J. Lau, pers. comm. 1997).

The original native flora of Hawaii consisted of about 1,400 species, nearly 90 percent of which were endemic. Of the total native and naturalized Hawaiian flora of 1,817 taxa, 47 percent were introduced from other parts of the world, and nearly 100 species have become pests (Smith 1985; Wagner *et al.* 1999a). Several studies (Cuddihy and Stone 1990; Wood and Perlman 1997; Robichaux *et al.* 1998) indicate nonnative plant species may outcompete native plants similar to *Cyanea obtusa*. Competition may be for space, light, water, or nutrients, or there may be a chemical inhibition of other plants (Smith 1985; Cuddihy and Stone 1990). In addition, nonnative pest plants found in habitat similar to that of this species have been shown to make the habitat less suitable for native species (Smathers and Gardner 1978; Smith 1985; Loope and Medeiros 1992; Medeiros *et al.* 1992; Ellshoff *et al.* 1995; Meyer and Florence 1996; Medeiros *et al.* 1997; Loope *et al.* 2004). In particular, alien pest plant species modify habitat by modifying availability of light, altering soil-water regimes, modifying nutrient cycling, or altering fire characteristics of native plant communities (Smith 1985; Cuddihy and Stone 1990; Vitousek *et al.* 1987). Because of demonstrated habitat modification and resource competition by nonnative plant species in habitat similar to habitat of *Cyanea obtusa*, the Service believes nonnative plant species are a threat to *Cyanea obtusa*. The remaining unmanaged populations of *Cyanea obtusa* are still impacted by this threat.

Nonnative plants are being controlled in one of the six known populations of this species, but

will probably never be completely eradicated because new propagules are constantly being dispersed into the fenced area from surrounding, unmanaged lands. Currently, many widespread alien plant taxa cannot be completely eradicated from Maui, and therefore are expected to continue dispersing into previously managed areas (Loope 1998, Smith 1985). The remaining unmanaged populations of *C. obtusa* are still impacted by this threat.

In addition, species like *Cyanea obtusa* that are endemic to single small islands are inherently more vulnerable to extinction than widespread species because of the higher risks posed to a few populations and individuals by genetic bottlenecks, random demographic fluctuations and localized catastrophes such as hurricanes. When considered on their own, the natural processes associated with being a single island endemic and the habitat perturbation caused by hurricanes do not affect *C. obtusa* to such a degree that it is threatened or endangered with extinction in the foreseeable future, but these natural processes can exacerbate the threat from anthropogenic factors, such as habitat loss for human development or predation by nonnative species.

CONSERVATION MEASURES PLANNED OR IMPLEMENTED

The State of Hawaii and private landowners have initiated ungulate control and weed control in some of the areas where this species occurs. Construction of an ungulate exclosure fence in the Kahakuloa Game Management Area on Maui, funded through a Service grant to the State Division of Forestry and Wildlife, will protect individuals of *Cyanea obtusa* in this area (Maui Pineapple Company, Ltd. 1999). The fence construction began in August 2004 and is ongoing. *Cyanea obtusa* will continue to be threatened by ungulates until the fence is completed and ungulates removed from within the fenced area. The West Maui Watershed Partnership, a non-governmental, non-profit partnership composed of west Maui landowners and managers, received funding from the Service over the last five years for ungulate exclosure fences, which have been completed, and ungulate and nonnative plant control, which is ongoing. These actions provide protection to the individuals of *Cyanea obtusa* in the fenced areas in the west Maui Mountains.

SUMMARY OF THREATS:

The major threats to *Cyanea obtusa* are pigs, goats, cattle, and nonnative plant species, which are believed to be a major cause of the decline of this species throughout its range. Rats and slugs are potential threats. Feral ungulates have been fenced out of one of the six populations of this species, and another fence is under construction to protect a second population. Continued monitoring and maintenance of these fences will be necessary as feral ungulates from surrounding areas can easily access fenced areas. In addition, the remaining, unfenced individuals of this taxon are still impacted by this threat. Nonnative plant control is underway in the fenced population and will be initiated in the second fenced population once the fence is completed. These on-going conservation efforts for this species currently benefit only one of the six known populations. The species as a whole is still impacted by these threats and will require long-term monitoring and management to maintain threat free areas.

LISTING PRIORITY:

THREAT		

Magnitude	Immediacy	Taxonomy	Priority
High	Imminent	Monotypic genus	1
		Species	2*
	Non-imminent	Subspecies/population	3
		Monotypic genus	4
		Species	5
Moderate to Low	Imminent	Subspecies/population	6
		Monotypic genus	7
		Species	8
	Non-imminent	Subspecies/population	9
		Monotypic genus	10
		Species	11
		Subspecies/population	12

Rationale for listing priority number:

Magnitude:

This species is highly threatened by feral goats, pigs, and cattle that degrade and destroy habitat, and by nonnative plants that outcompete and displace it. Potential threats include rats and slugs that may directly prey upon individuals of *Cyanea obtusa*. Threats to the montane and mesic forest habitat of *C. obtusa* and to individuals of this species occur throughout its range, and are expected to continue or increase without their control or eradication. Feral ungulates have been fenced out of one of the six populations of this species, and another fence is under construction to protect a second population. Continued monitoring and maintenance of these fences will be necessary as feral ungulates from surrounding areas can easily access fenced areas. In addition, the remaining, unfenced individuals of this taxon are still impacted by this threat. Nonnative plant control is underway in the fenced population and will be initiated in the second fenced population once the fence is completed. These on-going conservation efforts for this species currently benefit only one of the six known populations. The species as a whole is still impacted by these threats and will require long-term monitoring and management to maintain threat free areas. In addition, species like *Cyanea obtusa* that are endemic to single small islands are inherently more vulnerable to extinction than widespread species because of the higher risks posed to a few populations and individuals by genetic bottlenecks, random demographic fluctuations and localized catastrophes such as hurricanes.

Imminence:

Threats to *Cyanea obtusa* from feral goats, pigs, and cattle, and nonnative plants are imminent because they are ongoing in five of the six known populations.

Yes Have you promptly reviewed all of the information received regarding the species for the purpose of determining whether emergency listing is needed?

Is Emergency Listing Warranted? No. The species does not appear to be appropriate for

emergency listing at this time because the immediacy of the threats is not so great as to imperil a significant proportion of the taxon within the time frame of the routine listing process. In addition, the State of Hawaii and private landowners have initiated ungulate control and weed control in some of the areas where this species occurs. If it becomes apparent that the routine listing process is not sufficient to prevent large losses that may result in this species' extinction, then the emergency rule process for this species will be initiated. We will continue to monitor the status of *Cyanea obtusa* as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures.

DESCRIPTION OF MONITORING:

Much of the information in this form is based on the results of three meetings of 20 botanical experts held by the Center for Plant Conservation in December 1995, November 1996, and 1999, and was updated by personal communication with Arthur C. Medeiros, III, U.S.G.S. Biological Resources Discipline, in 1996; Steve Perlman, National Tropical Botanical Garden, in 1994; Joel Lau, Hawaii Natural Heritage Program, in 1994, 1997, and 1999; Hank Oppenheimer, Maui Land and Pineapple Company, in 1999; Jack Jeffrey, Service, in 1995; Loyal Mehrhoff, Service, in 1994; and Alvin Yoshinaga, Lyon Arboretum, in 1995. We have incorporated additional information on this species from our files and the most recent supplement to the *Manual of the Flowering Plants of Hawaii* (Wagner and Herbst 2003). In 2004, the Pacific Islands office contacted the following species experts: Bob Hobdy, retired from Hawaii Division of Forestry and Wildlife; Joel Lau, Hawaii Natural Heritage Program; Art Medeiros, U.S.G.S. Biological Resources Discipline; Hank Oppenheimer, resource manager for Maui Land and Pineapple Company; and Steve Perlman and Ken Wood, National Tropical Botanical Garden. No new information was provided by these individuals and they were not able to clarify the current status of these plants in 2004. In 2005 we contacted the species experts listed below, but received no new information.

The Hawaii Natural Heritage Program identified this species as critically imperiled (Hawaii Natural Heritage Program Database 2004). Based on the International Union for Conservation of Nature and Natural Resources Red Plant Data Book rarity categories, this species was recognized as presumed extinct by Wagner *et al.* (1999b).

Species experts were contacted but did not provide new information this year, no new literature was found, and no known entities are studying this species. However, it is highly likely that the previously reported threats continue to impact the species at the same or an increased level.

COORDINATION WITH STATES:

In October 2004 we provided the Hawaii Division of Forestry and Wildlife with copies of our most recent candidate assessments for their review and comment. Vickie Caraway, the State botanist, reviewed the information for this species and provided no additional information or corrections (V. Caraway, pers. comm. 2005).

LITERATURE CITED

List all experts contacted:

Name	Date	Place of Employment
1. Joel Lau	June 28, 2005	Hawaii Natural Heritage Program
2. Art Medeiros	June 28, 2005	U.S.G.S. Biological Resources Discipline
3. Jim Jacobi	June 28, 2005	U.S.G.S. Biological Resources Discipline
4. Rick Warshauer	June 28, 2005	U.S.G.S. Biological Resources Discipline
5. Hank Oppenheimer	June 28, 2005	Maui Land and Pineapple Company
6. Kapua Kawelo	June 28, 2005	U.S. Army
7. Dave Lorence	June 28, 2005	National Tropical Botanical Garden
8. Steve Perlman	June 28, 2005	National Tropical Botanical Garden
9. Ken Wood	June 28, 2005	National Tropical Botanical Garden
10. Marie Bruegmann	July 13, 2005	U.S. Fish and Wildlife Service
11. Vickie Caraway	June 14, 2005	Hawaii Division of Forestry and Wildlife

List all databases searched:

Name	Date
1. Hawaii Natural Heritage Program	2004

Other resources utilized

- Center for Biological Diversity, Dr. Jane Goodall, Dr. E.O. Wilson, Dr. Paul Ehrlich, Dr. John Terborgh, Dr. Niles Eldridge, Dr. Thomas Eisner, Dr. Robert Hass, Barbara Kingsolver, Charles Bowden, Martin Sheen, the Xerces Society, and the Biodiversity Conservation Alliance. 2004. Hawaiian Plants: petitions to list as federally endangered species. May 4, 2004.
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- Corn, C.A., G. Clarke, L. Cuddihy, and L. Yoshida. 1979. A botanical reconnaissance of Kalalau, Honopu, Awaawapuhi, Nualolo and Milolii Valleys and shorelines—Na Pali, Kauai. Unpublished report. Division of Forestry and Wildlife, Department of Land and Natural Resources, Endangered Species Program, Honolulu. 14 pp.
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APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes to the candidate list, including listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all 12-month petition findings, additions of species to the candidate list, removal of candidate species, and listing priority changes.

Approve: **Acting** David W. Winkler 11/10/05
Regional Director, Fish and Wildlife Service Date

Marshall P. Jones

Concur: _____ August 23, 2006
Director, Fish and Wildlife Service Date

Do not concur: _____
Director, Fish and Wildlife Service Date

Date of annual review: September 16, 2005
Conducted by: Marie M. Brueggmann, Pacific Islands FWO
Plant Recovery Coordinator

Comments:
PIFWO Review

Reviewed by: Christa Russell Date: September 18, 2005
Plant Conservation Program Leader

Gina Shultz Date: October 17, 2005
Assistant Field Supervisor,
Endangered Species

Patrick Leonard Date: October 17, 2005
Field Supervisor